DEFENSE MAPPING AGENCY

Annual
Report
1986

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About This Report

This report describes the status of the Defense Mapping Agency (DMA) and summarizes the activities of DMA for FY 1986. It describes our requirements process, summarizes available resources, provides the status of our modernization program, and gives accomplishments in terms of products produced. The purpose of this report is to provide information to users about DMA and summarize the current status and many accomplishments of DMA during FY 1986.

DMA Mission

To enhance national security and support our strategy of deterrence by producing and distributing to the Joint Chiefs of Staff, Unified and Specified Commands, Military Departments, and other Department of Defense users, complete, credible, effective, and usable mapping, charting, and geodetic products, services, and training at the right place, in the right quantity, and at the right time. To ensure our warfighting forces have available to them effective mapping, charting and geodetic support should our strategy of deterrence fail. To provide nautical charts and marine navigational data to worldwide merchant marine and private vessel operators. To maintain liaison with civil agencies and other national and international scientific and other organizations engaged in mapping, charting, and geodetic activities.

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DMA Annual Report
Director's Message

To Our Users:

This report highlights major accomplishments of the Defense Mapping Agency during Fiscal Year 1986. We are proud of what we have accomplished in the face of increasingly sophisticated requirements and reduced funding.

You will see that we produced some 58 million copies of military maps and charts--including nearly 4,000 new or revised products. At the same time, we digitized over five million square nautical miles of the Earth, developed over 700 thousand square nautical miles of Point Positioning Data Bases, located some 13,000 strategic points, and took more than 37,000 gravity measurements around the world.

DMA is clearly a combat support agency. You will note that about 50 percent of our resources support tactical operations of land, sea, and air combat forces, while another 34 percent provide guidance and navigational data for ballistic and cruise missiles, as well as strategic and tactical bomber operations. The remaining 16 percent of DMA resources are devoted to safety of navigation and planning, and evacuation.

To keep ahead of rapidly-developing and ever-more sophisticated modern weapons systems, DMA has undertaken a major "Modernization Program". This is in reality a Congressionally-mandated conversion into a virtually all-digital production mode, driven by varied source information and increasing requirements. It will increase DMA productivity by 50 percent. An interim phase of this effort, the MARK 85 program, is well underway, with scores of workstations, communications systems, and transitional electronic equipment now on-line in our several production elements, with production lines already working around the clock in many areas.

Our Research and Development, acquisition, and logistics programs leading into the MARK 90 phase of the Modernization Program are coupled with Agency-wide personnel programs, not just educational and training to function in the new mode, but predicated upon a "One DMA" concept. We intend to tie all of our operational elements into a single, digitized production effort, with worldwide data transmission links not only between DMA elements but, in time, directly to you, the operational commands which must have DMA products and data to function effectively.

When fully operational, the new DMA "production line" will range from collection of data with sensors high above the Earth and on the oceans' floors, through DMA manipulation and production technology beyond the "state-of-the-art", and out to the cockpit of a fighting aircraft, the turret of a tank, the command center of an aircraft carrier--or into your electronic command post.

This, DMA will accomplish in the face of budget reductions and Defense Reorganization Act strictures. Our role as a combat support agency must be met to help you fulfill your vital mission. We need your understanding of our capabilities and our limitations. Together, we must work constantly to ensure realistic requirements and valid priorities. With that understanding and support, we will continue to provide you with complete, credible, and effective mapping, charting, and geodetic products and data to ensure this nation's strategy of deterrence does not fail through lack of MC&G information.

ROBERT A. ROSENBERG
Major General, USAF
Director

DMA Provides Combat Support

On Land

DMA provides tactical fighting forces with large and medium scale tactical topographic maps, militarized city maps, and other topographic publications and services. The advent of special operations forces has significantly increased the demand for these traditional products. New weapons systems, such as FIREFINDER and guidance systems for weapons such as PERSHING II, have introduced the need for digital products to support our land combat forces. Mechanized forces also use digital DMA products to display terrain roughness and other area limiting factors.

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In The Air

DMA provides navigation and planning charts, weather plotting charts, graphic displays for simulators, Flight Information Publications, and other publications required for safe flight and accurate aerial navigation. DMA updates some of these products every 56 days. Gravity, geophysical, and target data collected by DMA support the MX and accurately guide strategic missiles to targets. Digital landmass/water matrix data are required for the Airborne Warning and Control System to detect ship and aircraft near shorelines. Terrain Contour Matching Data and Vertical

At Sea

DMA provides nautical charts and publications essential for safe and accurate naval operations. Fleet operations require small and medium scale nautical charts for enroute navigation; large scale charts for approaching and anchoring in ports and harbors; and bottom contour and Bathymetric Navigation Charts for undersea and antisubmarine warfare. Systems such as TRIDENT II, Sea-Launched Cruise Missiles, TOMAHAWK, and AEGIS command displays cannot operate without digital data bases produced by DMA. DMA also provides to both the military and the merchant marine with the services required for safe navigation at sea. These include Notice to Mariners, radio broadcasts of navigational warnings, Light Lists, Sailing Directions, and worldwide harbor and operational navigation charts.

Obstruction Data guide cruise missiles to land targets. DMA provides precise target position, navigation charts, digital cockpit graphics, and digital terrain contour data required to fly and deliver bombs with pinpoint accuracy by all modern strategic and tactical bombers, fighter aircraft, and helicopters of all military departments.

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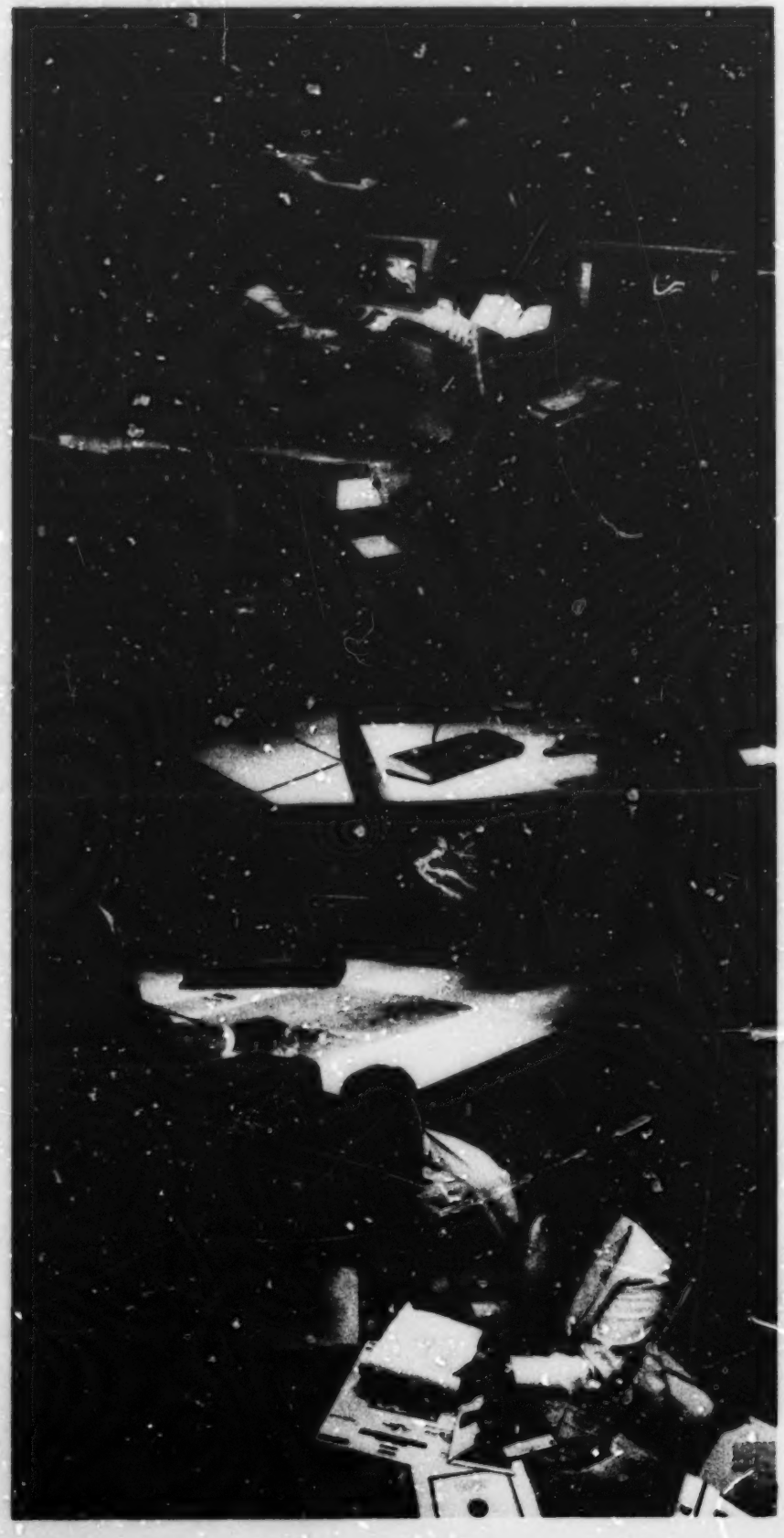
Progress and Challenges

In order to maintain a viable deterrent power and to meet the ever-increasing threat to U.S. interests worldwide, the DoD has substantially improved and modernized its fighting forces and weapon systems. The DMA challenge is to meet the increased need for Mapping, Charting and Geodetic (MC&G) products, especially for new high technology weapon systems, while continuing to meet the needs of operational war-fighting commanders.

DMA has made substantial progress toward meeting those needs. Improvements have been made to DMA *crisis management and contingency planning*. We have streamlined our crisis support operations and improved contingency planning by preplanning standard and tailored products for MC&G requirements in support of contingency plans. We have developed an *expedited response* capability which enables DMA to accelerate the production process for special requirements and to accommodate out-of-cycle requests. We have markedly improved our user interface with continuous command attention, higher level involvement, and new customer service. We are establishing *on-site DMA presence* by providing liaison officers at U&S Commands and representatives to the Military Departments and OSD for early identification of MC&G needs for new systems development. *Mobile training teams* have taken MC&G training directly to the field and aboard ships. Increased participation in *JCS exercises* has sharpened our support of operational forces. Increased emphasis on *international agreements* has expanded the input of products from foreign coproducers of MC&G products. Continued emphasis on productivity has resulted in *32% growth in productivity* since DMA's inception in 1972. Our *Modernization Program* promises major productivity improvements that will enable elimination of the large backlog of unmet user requirements.

DMA has truly made substantial progress, but challenges remain. *Requirements need to be scrubbed* to ensure that the most needed requirements are met and the most essential data are provided. *Budget reductions*, including manpower reductions implied by the 1986 Reorganization Act, threaten to reduce MC&G support below acceptable levels. A proposed *revised JCS priority system* will require careful implementation and monitoring. *War reserves* must be analyzed to ensure that only essential reserves are maintained and that distribution and restock plans are in place. *Maps and charts need to be reviewed* to eliminate "nice to have" features, to increase standardization, and to optimize specifications for computer compilation. *Alternative sources* such as SPOT and LANDSAT must be incorporated and increased reliance placed on native products. The needs of *advanced systems* must be met in ways that do not restrict area of deployment and allow early operational performance. And finally, *products must be available to the user* where and when the user needs them. Distributed architecture and two-way communications between DMA and commanders in the field are needed for *on-site access* to digitized maps and other digital products, and *on-site update* of products based on their use in the field.

FY 86 Accomplishments



◇ Produced and distributed over 58 million maps and charts.

◇ Developed over 4,000 new or revised maps and charts.

◇ Published over 500 publications on mapping, charting, and geodetic subjects.

◇ Digitized over 5 million square nautical miles of elevations and developed 700 thousand square nautical miles of point positioning data bases.

◇ Fixed precise positions and elevations of 13,000 strategic points on the surface of the Earth.

◇ Measured gravity at over 37,000 locations around the world.

◇ Provided operational support in over 30 crises, e.g., the Sudanese relief effort, the Achille Lauro hijack operations, the Libyan action, and the Bolivian drug interdiction operations.

◇ Completed development and began testing of modern new production equipment including a digital comparator, a feature extraction system, and a source analysis system.

◇ Expanded our mobile training teams, providing on-site MC&G training from North Dakota to Thailand and aboard aircraft carriers at sea.

◇ Improved customer service by establishing a single point of contact with a new "800" number for information on DMA products.

◇ Expanded DMA exercise participation to fully exercise our new Combat Support Plan.

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DMA Facilities Worldwide

HQ
WASH., DC

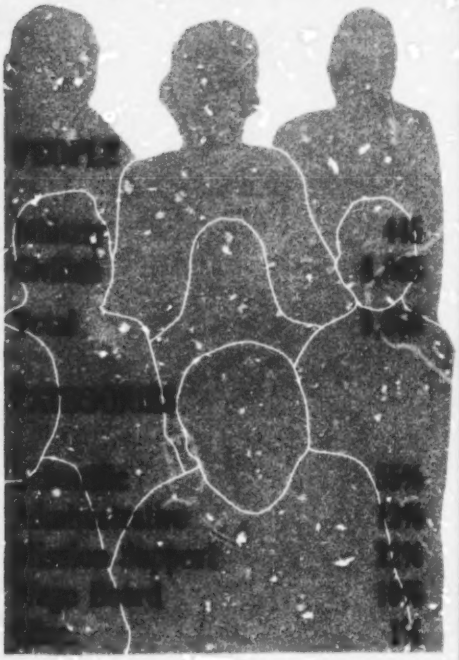
Hydrographic/Topographic Center Washington, DC	Combat Support Center** Washington, DC	Mapping School Ft. Belvoir, VA
Aerospace Center St. Louis, MO	Distribution Center Clearfield, UT	Systems Center McLean, VA
Field Offices	Distribution Center Philadelphia, PA	Inter-American Geodetic Survey Ft. Sam Houston, TX
Louisville, KY Kansas City, MO Providence, RI* San Antonio, TX	Combat Support Elements	Office of Telecommunications Services Reston, VA
	Tampa, FL Norfolk, VA Jacksonville, FL San Diego, CA Hawaii Japan Philippines Italy Germany England Panama	

*Closes in 1987
**Formerly Office of Distribution Services

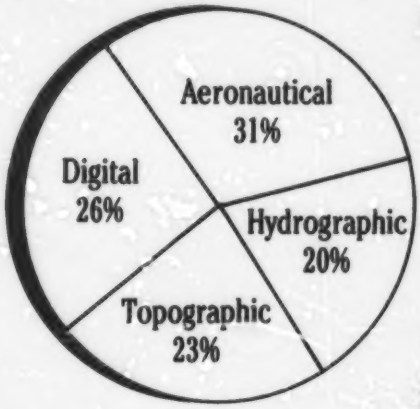
DMA Resources

FY 1986 FUNDING (MILLIONS)

RDT&E	247.1
Procurement	53.9
O&M	437.8
MILCON	0.8
Total	739.6



RESOURCE ALLOCATION



FOREIGN AGREEMENTS

92 Countries
Assigned Coproduction

	DMA	COPRODUCER
Aeronautical	74%	26%
Hydrographic	67%	33%
Topographic	76%	24%
Digital	86%	14%

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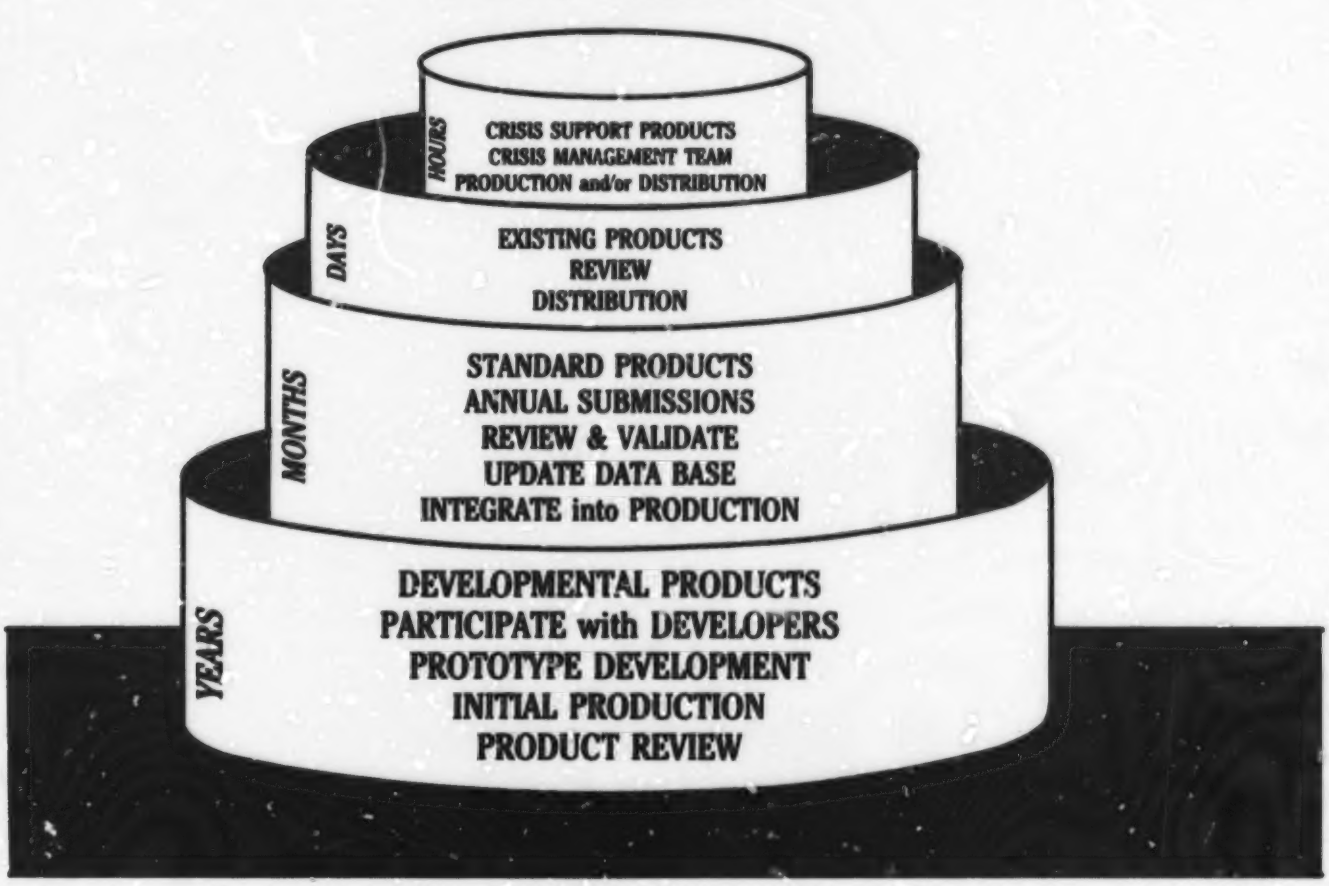
Requirements Process



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CRISIS SUPPORT PRODUCTS
- -Requests to DMA
- -Review by Crisis Management Team
- -Provide Standard Products where Available
- -Produce Special Products where Required
- -Rapid Response Required

EXISTING PRODUCTS
- -Requests to DMA
- -Requests Reviewed
- -Product Availability Determined
- -Product Distribution

STANDARD PRODUCTS
- -Annual Area Requirements Submission
- -DMA Review & Validation
- -Review with JCS/J-3 & C³I
- -Update Automated Data Base
- -Analyze Priorities & Precedences
- -Program for Production

DEVELOPMENTAL PRODUCTS
- -Required for New Weapon Systems
- -Participate with Developers
- -Develop Prototype
- -Participate in System T&E
- -Finalize Product Specification
- -Produce for Initial Development

MC&G production and distribution are based on user requirements. DMA distributes available maps and responds to crises requirements upon request. Requests for new standard products can take up to 30 months to fill. Service and CINC requirements for new coverage far outstrip DMA resources to respond. Production of new standard products is based on priorities established by JCS. DMA works closely with weapon system developers to plan for meeting new kinds of products and services. In all cases, DMA attempts to meet the highest priority requirements based on user and JCS priority determinations.

Typical Products

	INVENTORY/DISTRIBUTION OCT 85-SEP 86	
	LINE ITEMS IN INVENTORY	COPIES DISTRIBUTED
HYDROGRAPHIC		
Operational Navigation Charts	717	480,069
Harbor/Approach Charts	2,655	1,179,718
Coastal Charts	1,772	934,394
Combat Charts	301	110,496
Navigation Publications	1,366	337,375
TOPOGRAPHIC		
1:50,000 Topographic Maps	25,000	25,000,000
1:100,000 Topographic Maps	1,000	100,000
Joint Operations Graphics (Ground)	1,400	1,400,000
City Products	1,000	100,000
AERONAUTICAL		
Operational Navigation Charts	270	2,950,186
Joint Navigation Charts	122	1,110,491
Joint Operations Graphics (Air)	3,636	7,460,695
Joint Operations Graphics (Radar)	1,517	416,144
Tactical Pilotage Charts	475	4,929,511
Air Target Chart 1:200,000	4,324	958,822
DIGITAL		
Digital Terrain Elevation Data (DTED)	3,500	35,000 Cells
Digital Feature Analysis Data (DFAD)	2,500	5,000 Cells

Typical Products

	MAINTENANCE/PRODUCTION OCT 85-SEP 86	
	QUANTITIES	
	NEW	REVISED
[illegible]		
[illegible]	105	40
[illegible]	34	337
[illegible]	48	226
[illegible]	29	10
[illegible]	6	116
TOPOGRAPHIC		
1:50,000 Topographic Maps	1,065	263
1:100,000 Topographic Maps	48	--
Joint Operations Graphics (Ground)	59	113
City Products	15	32
[illegible]		
[illegible]	--	34
[illegible]	--	13
[illegible]	35	134
[illegible]	21	69
[illegible]	34	26
[illegible]	22	148
DIGITAL		
Digital Terrain Elevation Data (DTED)	392	524
Digital Feature Analysis Data (DFAD)	32	158
Strategic Target Points	4,819	4,387

Modernization Improvements

Exploitation Modernization

The objective of the Exploitation Modernization Program (EMP) is to provide, by the early 1990's, a digital production capability which will improve flexibility and enhance DMA's ability to respond to user needs. The all-digital environment will result in a 75 percent decrease in production time, and a 50 percent reduction in production cost.

The EMP has two phases: MARK 85, which delivers new production capabilities between 1985-1987, and MARK 90, which targets all-digital production by the mid-1990's.

MARK 85 has delivered four systems. The Feature Extraction (FE) System provides modern workstations capable of semi-automatic terrain and interactive feature extraction from a photographic source. The Digital Comparator (DC) System provides terrain data extraction in a semi-automatic mode and tie point mensuration. The Hard Copy Exploitation (HE) System has provided computer software to implement photogrammetric models appropriate to a variety of existing equipment in DMA. The Source Acquisition System (SAS) has also been installed to facilitate production planning by interactively selecting source material.

MARK 90 activities are now in the preliminary design stages and scheduled for review in 1987.

Other Improvements:

GGSS: A Gravity Gradiometer Survey System is being developed to provide a capability to measure gravity in areas which are difficult to measure. A significant improvement in collection rates will be realized.

ABSS: An Airborne Bathymetric Survey System is being developed for rapid collection of coastal bathymetry to support hydrographic products. The ABS System will provide full coverage of the ocean bottom to depths of about 30 meters using a laser sounder for accurate depth measurements at approximately 10 meter intervals.

GEOSAT: A Navy-sponsored satellite altimeter program successfully completed collecting 7207 revolutions of precise sea surface height measurements for inclusion in the world gravity data base. A total of more than 50 million individual observations of the height of the sea surface above the WGS-72 reference ellipsoid were made.

WGS 84: An improved world reference frame WGS-84 was completed based on geodetic observations collected from numerous geodetic satellite programs and surface data holdings.

Obtaining DMA Products

Fielded Systems

DMA has established a Central Point of Contact for information on its products and services. The Central Point of Contact will forward requests for information or products to the appropriate DMA office, which will respond directly to the user.

Direct requests to:

DMA Combat Support Center*
ATTN: DOA
Washington, DC 20315-0030

Or contact them at:

AUTOVON 287-2495
Commercial (301)227-2495
1-800-826-0342 or TELEX 710-824-0293

Developing Systems

Activities requiring products for prototype or developing systems should forward their request to the following address:

Director, Defense Mapping Agency
ATTN: PRW
Bldg. 56, U.S. Naval Observatory
Washington, DC 20305-3000

Or Phone:

AUTOVON 294-1453
Commercial (202)653-1452

Contractors should submit requests through their government sponsor.

*Formerly Office of Distribution Services

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*AUTOVON is 294 plus last four digits

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